

UNCLASSIFIED

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)								DATE February 2000			
BUDGET ACTIVITY 07 - Operational System Development				PE NUMBER AND TITLE 0305165F NAVSTAR GPS (Space)				PROJECT 673030			
COST (\$ in Thousands)		FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost	
673030	NAVSTAR GPS (Space & Control)	101,587	107,451	250,197	209,114	181,291	132,711	101,958	Continuing	TBD	
Quantity of RDT&E Articles		0	0	0	0	0	0	0	0	0	
<p>(U) <u>A. Mission Description</u></p> <p>*Note: FY99 efforts funded in PE 64480F are described in this R-2 exhibit for program clarity.</p> <p>This program element funds Research and Development for the NAVSTAR Global Positioning System (GPS) Space and Control segments of the overall GPS program. This includes: satellite development, procurement, and deployment; training simulators; Mission Operation Support Center (MOSC); and ground control segment operation, including sustaining engineering, space and ground segments upgrades, and R&D efforts to support the entire GPS system deployment.</p> <p>The program has been restructured since the FY00 PB submission. Block IIF satellites 7 through 9 procurement was delayed by two years (FY01 to FY03) due to extended mean mission duration of Block IIA satellites currently on orbit. This PE also funds Modernization which includes adding new civil and military capabilities to 12 Block IIR and the first 6 Block IIF satellites. Block IIR modernization includes adding a second civil signal and a new military signal to the last 12 satellites. The first six Block IIF satellites will already include the second civil signal. They will be modernized to include a third civil signal (L5) and the new military signal. Starting with Block IIF, satellite vehicle 7, a higher power spot-beam antenna will be added to provide enhanced anti-jam capability. This budget request assumes a \$67.5M FY00 reprogramming action (\$18M procurement/\$45.5M RDT&E).</p> <p>Funding for the civil portion of GPS Modernization (beginning in 2001) was previously included in the Department of Transportation budget request.</p> <p>(U) <u>FY 1999 (\$ in Thousands)</u></p> <p>(U) \$771 Continued system engineering, including Joint Spectrum Center (JSC) support and GPS Engineering Management (GEM) System development</p> <p>(U) \$2,545 Continued training simulator development</p> <p>(U) \$11,878 Completed Operational Control Segment (OCS) Consolidated Contract for Common Operator Support Environment (COSE), Block IIR Full Functionality, and continued OCS Architectural Implementation</p> <p>(U) \$3,004 OCS Transition to Operations Accomplished</p> <p>(U) \$346 Continued space long-range planning and analysis (PE 64480F and PE 35165F)</p> <p>(U) \$999 Continued GPS IIA/IIF/IIR Integrated Mission Operation Support Center (IMOSC) development</p> <p>(U) \$11,064 Continued GPS IIF direct inject (PE 64480F and PE 35165F)</p>											
Project 673030				Page 1 of 7 Pages				Exhibit R-2 (PE 0305165F)			

UNCLASSIFIED

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE
BUDGET ACTIVITY		PROJECT
07 - Operational System Development	0305165F NAVSTAR GPS (Space)	February 2000 673030
(U) <u>A. Mission Description Continued</u>		
(U) <u>FY 1999 (\$ in Thousands) Continued</u>		
(U) \$303	Continued GPS program support (PE 64480F and PE 35165F)	
(U) \$23,000	Continued IIF satellite development (PE 64480F)	
(U) \$2,838	Continued IIF satellite associated development including launch vehicle integration, award fees, and integration studies and services (PE 64480F)	
(U) \$3,390	Continued clock technology development (PE 64480F)	
(U) \$29,008	Continued IIF OCS development (PE 64480F)	
(U) \$2,791	Continued IIF OCS associated development including Selective Availability Anti-Spoofing Module (SAASM) control segment (CS) changes, IIF system simulator development and studies (PE 64480F)	
(U) \$3,200	Continued GPS Modernization Space/Control development and technical support (PE 64480F)	
(U) \$6,450	Continued GPS Modernization technical support (PE 64480F)	
(U) \$101,587	Total	
(U) <u>FY 2000 (\$ in Thousands)</u>		
(U) \$1,103	Continue system engineering, including JSC support and GEM System development	
(U) \$1,685	Continue Control Segment training simulator development	
(U) \$12,917	Continue development of OCS Architectural Implementation	
(U) \$300	Complete space long-range planning and analysis	
(U) \$1,099	Continue IIA/IIF/IIR IMOSC development	
(U) \$3,444	Complete IIF satellite development	
(U) \$5,390	Continue IIF clock technology development	
(U) \$2,700	Begin IIF Space Vehicle (SV) compatibility analysis	
(U) \$1,882	Continue IIF satellite associated development including launch vehicle integration, award fees, and integration studies and services	
(U) \$2,250	Complete IIF direct inject	
(U) \$38,823	Continue IIF OCS development	
(U) \$4,083	Continue IIF OCS associated development including SAASM CS changes and IIF system simulator development	
(U) \$26,388	Continue GPS Modernization Space/Control development	
(U) \$5,052	Continue GPS Modernization technical support	
(U) \$335	Continue GPS program support	
(U) \$107,451	Total	
Project 673030	Page 2 of 7 Pages	Exhibit R-2 (PE 0305165F)

UNCLASSIFIED

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)		DATE February 2000		
BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT		
07 - Operational System Development	0305165F NAVSTAR GPS (Space)	673030		
(U) <u>A. Mission Description Continued</u>				
(U) <u>FY 2001 (\$ in Thousands)</u>				
(U) \$1,100	Continue system engineering, including JSC support and GEM System development			
(U) \$1,731	Continue CS training simulator development			
(U) \$3,707	Complete development of OCS Architectural Implementation			
(U) \$2,820	Continue IIA/IIF/IIR IMOSC development			
(U) \$4,650	Continue IIF clock technology development			
(U) \$2,347	Continue IIF SV compatibility analysis			
(U) \$4,454	Continue IIF satellite associated development including launch vehicle integration, award fees, and integration studies and services			
(U) \$42,972	Continue IIF OCS development			
(U) \$1,615	Continue IIF OCS associated development including SAASM CS changes and IIF system simulator development			
(U) \$4,900	Begin GPS Launch/Early Orbit (L/EO) consolidation			
(U) \$168,400	Continue GPS Modernization Space/Control development (for all IIF and 12 IIR satellites)			
(U) \$10,750	Continue GPS Modernization technical support			
(U) \$751	Continue GPS program support			
(U) \$250,197	Total			
(U) <u>B. Budget Activity Justification</u>				
This program is in Budget Activity 7 - Operational Systems Development because it is a post-Milestone III program.				
(U) <u>C. Program Change Summary (\$ in Thousands)</u>				
	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total Cost</u>
(U) Previous President's Budget (FY 2000 PBR)	94,404	98,890	108,851	TBD
(U) Appropriated Value	94,746	108,890		
(U) Adjustments to Appropriated Value				
a. Congressional/General Reductions	-342	-1		
b. Small Business Innovative Research	-3,134			
c. Omnibus or Other Above Threshold Reprogram		-590		
d. Below Threshold Reprogram	10,885			
e. Rescissions	-568	-848		
f. Other				TBD
Project 673030	Page 3 of 7 Pages	Exhibit R-2 (PE 0305165F)		

UNCLASSIFIED

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)							DATE February 2000		
BUDGET ACTIVITY 07 - Operational System Development				PE NUMBER AND TITLE 0305165F NAVSTAR GPS (Space)			PROJECT 673030		
(U) C. Program Change Summary (\$ in Thousands) Continued									
			<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Total Cost</u>			
(U)	Adjustments to Budget Years Since FY 2000 PBR				141,346				
(U)	Current Budget Submit/FY 2001 PBR		101,587	107,451	250,197			TBD	
(U)	<u>Significant Program Changes:</u>								
	Significant Program Changes:								
	Funding: FY1999 Below Threshold Reprogramming (BTR) -\$.537 for canceled bills, -\$.845 for higher AF priorities, +\$9.941 for GPS IIF design change to incorporate direct inject requirement from EELV, and +\$2.326 OCS.								
	Schedule: First GPS Block IIF launch moved from March 03 to March 05 due to extended Mean Mission Duration of the Block IIA satellites.								
	Funding/Technical: \$141,346 increase in FY 2001 for expanded Modernization efforts. This includes the first 6 Block IIF satellites and last 12 Block IIR satellites, associated upgrades to the OCS, and funds added to put second civil signal and new military signal on IIR satellites. The first 6 block IIF satellites will include the second and third civil signals along with the new military signal. Block IIF satellites 7 and on will include these signals plus a high-power spot beam for added anti-jam capability.								
(U) D. Other Program Funding Summary (\$ in Thousands)									
		<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>	<u>Total Cost</u>
		<u>Actual</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	
(U)	AF RDT&E								
(U)	Other APPN								
(U)	Operations and Maintenance (PE 0305165F, BA 1 - Operating Forces, SAG 13D)	25,323	14,653	53,548	50,285	54,450	55,635	54,300	Continuing
(U)	Missile Procurement (PE 0305165F, BA 5 - Space and Other Support, P-20, 21)	87,837	125,400	210,341	235,429	410,219	362,888	315,229	Continuing
(U)	Other Procurement (PE 0305165F, BP 83 - Electronics and Telecommunications Equipment, WSC 6790, P-68, and WSC 6730.)	7,619	14,395	12,400	7,963	7,095	8,771	9,861	Continuing
Project 673030		Page 4 of 7 Pages							Exhibit R-2 (PE 0305165F)

UNCLASSIFIED

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE February 2000
--	------------------------------

BUDGET ACTIVITY 07 - Operational System Development	PE NUMBER AND TITLE 0305165F NAVSTAR GPS (Space)	PROJECT 673030
---	--	--------------------------

(U) **D. Other Program Funding Summary (\$ in Thousands)**

	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>	<u>Cost to</u>	<u>Total Cost</u>
	<u>Actual</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Complete</u>	
PE 0305164F, GPS User Equipment									
PE 0101221N, Fleet Ballistic Missile System									
PE 0301357F and 0305913F, Nuclear Detonation Detection System (NDS)									
PE 0305119F Space Boosters (Delta II)									
PE 0604480F, GPS Block IIF									

(U) **E. Acquisition Strategy**
 GPS OCS upgrade was competitively awarded to a single contractor (Lockheed Martin) in July 1995. Block IIF satellite and IIF ground systems development contract was competitively awarded to a single contractor (Boeing) in April 1996. The Single Prime Initiative (SPI) consolidates these efforts into one contract that was awarded to Boeing (with Lockheed Martin as a subcontractor) on 1 Oct 99.

(U) **F. Schedule Profile**

	<u>FY 1999</u>				<u>FY 2000</u>				<u>FY 2001</u>			
	1	2	3	4	1	2	3	4	1	2	3	4
(U) Continue OCS Architectural Implementation												
(U) Phase 3/4 delivery										X		
(U) IIA IMOSC system available					*							
(U) IIA IMOSC development complete										X		
(U) IIF IMOSC development begins											X	
(U) IIF satellite final design verification										X		
(U) GPS Modernization studies complete								X				
(U) Master Control Station interface to IIR Operational Support System dev				*								
(U) GPS Overarching Integrated Product Team (OIPT)				*						X		
(U) GPS Operational Requirements Document (ORD) Validation					*			X				
(U) GPS Program Review										X		
(U) GPS Modernization Space/Control development begins											X	
(U) GPS Modernization Long Lead Production begins												X

UNCLASSIFIED

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)							DATE February 2000			
BUDGET ACTIVITY					PE NUMBER AND TITLE			PROJECT		
07 - Operational System Development					0305165F NAVSTAR GPS (Space)			673030		
(U) A. Project Cost Breakdown (\$ in Thousands)										
					<u>FY 1999</u>		<u>FY 2000</u>			<u>FY 2001</u>
(U)	System Engineering including JSC and GEMS				771		1,103			1,100
(U)	CS Training Simulator Development				2,545		1,685			1,731
(U)	OCS Development/Sustainment				11,878		12,917			3,707
(U)	OCS Transition to Operations				3,004		0			0
(U)	Space long-range planning				346		300			0
(U)	IIF direct inject				11,064		2,250			0
(U)	IIA/IIF/IIR IMOSC development				999		1,099			2,820
(U)	IIF satellite development				23,000		3,444			0
(U)	IIF clock technology development				3,390		5,390			4,650
(U)	IIF SV compatibility analysis				0		2,700			2,347
(U)	IIF satellite associated development				2,838		1,882			4,454
(U)	IIF Operational Control System development				29,008		38,823			42,972
(U)	IIF OCS associated development				2,791		4,083			1,615
(U)	GPS L/EO consolidation				0		0			4,900
(U)	GPS Modernization Space/Control development				3,200		26,388			168,400
(U)	GPS Modernization Technical Support				6,450		5,052			10,750
(U)	GPS program support				303		335			751
(U)	Total				101,587		107,451			250,197
(U) B. Budget Acquisition History and Planning Information (\$ in Thousands)										
(U) Performing Organizations:										
<u>Contractor or</u>	<u>Contract</u>									
<u>Government</u>	<u>Method/Type</u>	<u>Award or</u>	<u>Performing</u>	<u>Project</u>						
<u>Performing</u>	<u>or Funding</u>	<u>Obligation</u>	<u>Activity</u>	<u>Office</u>	<u>Total Prior</u>	<u>Budget</u>	<u>Budget</u>	<u>Budget</u>	<u>Budget to</u>	<u>Total</u>
<u>Activity</u>	<u>Vehicle</u>	<u>Date</u>	<u>EAC</u>	<u>EAC</u>	<u>to FY 1999</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Complete</u>	<u>Program</u>

UNCLASSIFIED

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)										DATE
BUDGET ACTIVITY										PROJECT
07 - Operational System Development										673030
PE NUMBER AND TITLE										
0305165F NAVSTAR GPS (Space)										
(U) Performing Organizations Continued: <u>Product Development Organizations</u>										
Lockheed-Martin	CPAF/FFP	Jul 95	124,401	124,401	60,160	17,141	0	0	0	77,301
Applied Research Labs	MIPR	Mar 97	2,766	2,766	2,366	0	683	300	0	3,349
Boeing	FPAF/CPAF	Apr 96	Continuing	Continuing	128,104	72,650	36,664	92,435	Continuing	TBD
Boeing (SPI)	CPAF/CPFF	Oct 00	Continuing	Continuing	0	0	57,924	109,295	Continuing	TBD
TBD IIR Modernization	TBD	TBD	TBD	TBD	0	0	0	30,916	0	30,916
NRL	MIPR	Various	Continuing	Continuing	1,250	3,390	5,390	4,650	15,625	30,305
GPS Modernization Tech Spt	Various	Various	Continuing	Continuing	2,208	6,450	5,052	10,750	Continuing	TBD
Miscellaneous	Various	Various			1,131	536	0	0	Continuing	TBD
<u>Support and Management Organizations</u>										
System Engineering	Various	Various	N/A	N/A	19,410	771	1,103	1,100	Continuing	TBD
Program Support	Various	Various	N/A	N/A	6,890	303	335	751	Continuing	TBD
Miscellaneous	Various	Various	N/A	N/A	805	346	300	0	0	1,451
<u>Test and Evaluation Organizations</u>										
					<u>Total Prior</u>	<u>Budget</u>	<u>Budget</u>	<u>Budget</u>	<u>Budget to</u>	<u>Total</u>
<u>Subtotals</u>					<u>to FY 1999</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>Complete</u>	<u>Program</u>
Subtotal Product Development					195,219	100,167	105,713	248,346	TBD	TBD
Subtotal Support and Management					27,105	1,420	1,738	1,851	TBD	TBD
Subtotal Test and Evaluation										
Total Project					222,324	101,587	107,451	250,197	TBD	TBD